

**1.1 Basic Models**

**1.2 Direction Fields**

2.3 Modelling with ODEs

2.1 Separable ODEs

2.2 Linear First-Order ODEs

2.4 Linear vs Nonlinear ODEs

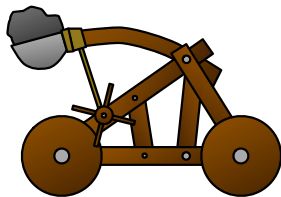
2.5 Autonomous ODEs

## 1.1 Basic Models

Let us model the altitude of a boulder thrown by a catapult!

1 Which basic Physics principle should we use?

- a Conservation of Angular Momentum
- b Newton's 2<sup>nd</sup> Law
- c Rate of Change = rate in – rate out
- d Conservation of Linear Momentum
- e Conservation of Energy

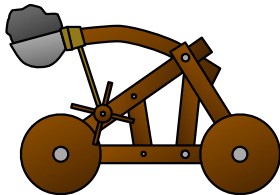


## 1.1 Basic Models

We need to know:

2 Acceleration =

3 Force =



## 1.1 Basic Models

- 4 What do we know about the boulder at  $t = 0$ ?

